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THE ANATOMY OF THE PAPILLA FOLIATA OF THE HUMAN INFANT.

By Frederick Tuckerman, M.D., B.Se., *Amherst, Massachusetts.* (Plate XVIII.)

Taste-bulbs have long been recognised in the folds or fringe of mucous membrane situated upon the lateral margins of the mammalian tongue, just in front of the anterior pillar of the fauces. They were first discovered in this region in the rabbit and hare, and later researches have shown them to be normally present on this part of the tongue in man, the horse, dog, pig, squirrel, rat, guinea-pig, mouse, bat, and some marsupials.

Of the animals just enumerated, those belonging to the order *Rodentia* usually have a well-developed papilla foliata. In man and the pig this organ varies much in appearance, and is generally more or less rudimentary in structure. In other animals, including some of those already mentioned, there exists in place of this organ a fringe of papillæ, which may or may not bear taste-bulbs. In the cat this fringe is particularly well marked. It consists of five to nine elongated and rather coarse cone-shaped papillæ, placed in a single row, and having their apices directed outwards. Sparingly scattered about the base of these papillæ are a few glands of the serous type. An examination of many sections of this fringe, from the tongue of the new-born kitten and full-grown cat, failed to reveal the presence of gustatory structures, though they occur in the epithelium of the neighbouring fungiform papillæ.

The papillæ foliatæ, or gustatory lamellæ of Turner, of the human tongue, offer an excellent area in which to study the taste-bulbs. They consist of five to eight irregular folds or

[1] Introduction to *Human Anatomy*, 1875, p. 380.

ridges,[1] with rounded or flattened crests, separated from each other by furrows which vary much in breadth and depth. Occasionally the bottom of a furrow is invaginated upwards into a ridge (fig., *F'*.) which usually bears a few taste-bulbs. Serous glands and ducts are very plentiful in the sub-mucous tissue underlying the folds, and are also frequently present within them. The ducts are oftentimes quite straight, sometimes winding, and occasionally of considerable length. They generally open between the folds, either at the sides or bottom of the furrows. I have seen in vertical sections as many as five separate ducts opening into a single furrow.

Each fold consists of one or more papillary upgrowths of the mucous membrane, the exposed surfaces of which are everywhere invested with a layer of epithelium of varying thickness.[2] Not unfrequently two, but more commonly three, papillary upgrowths of the mucous membrane are present, the depressions between them being filled largely with elongated, spindle-shaped, epithelial cells, nearly or quite to the level of the top of the fold.

The taste-bulbs of this gustatory area are a trifle smaller, generally speaking, than those of the circumvallate papilla. Their average length is about 0·075 mm., and their greatest transverse diameter 0·0375 mm. They are disposed at the sides of the folds (though frequently occurring on the summit) in several tiers. It is quite impossible to state, with any degree of accuracy, the exact number of tiers, owing to the lack of uniformity in the distribution of the bulbs. Very often they are present only upon one side of the furrow, and occasionally entire folds will be destitute of them. As seen in vertical section, the bulbs are separated from each other by an interval about equal to their transverse diameter. In horizontal section, however, they are placed much nearer together, and quite often are in contact by their edges. Frequently, in the interbulbous spaces, the faint outline of a bulb can be made out, suggesting

[1] In fœtuses of four and one-half and five months, I was unable to distinguish any lateral folds on the tongue. I had no opportunity of examining a fœtus of the sixth month, but in two of the seventh the folds were very clearly defined.

[2] The average thickness of the epithelial covering of the sides and upper surface of the folds, when destitute of taste-bulbs, is about 0·05 mm.; when there are bulbs present, it is, of course, thicker.

an alternate arrangement of the tiers. In a single instance a bulb was detected pushing its way up from the sub-epithelial tissue, between two adjacent ones, but not in contact with them. The basal end and lower third of this bulb rest in a cavity of the mucosa, and its apex penetrates the deeper layers of the epithelium. I estimated the number of bulbs in each lateral papilla at about 1500. This calculation was made from the papilla foliata of an infant four months old.

The bulbs vary considerably in size, shape, and general appearance, but most of them possess a well-defined neck, which sometimes projects for a short distance beyond the outer homogeneous layer of epithelium. In a few bulbs the outer extremity of the cover-cells had separated. It is possible that this appearance of the apex of a bulb has been mistaken by some observers for the peripheral processes of the taste-cells protruding through the free opening.

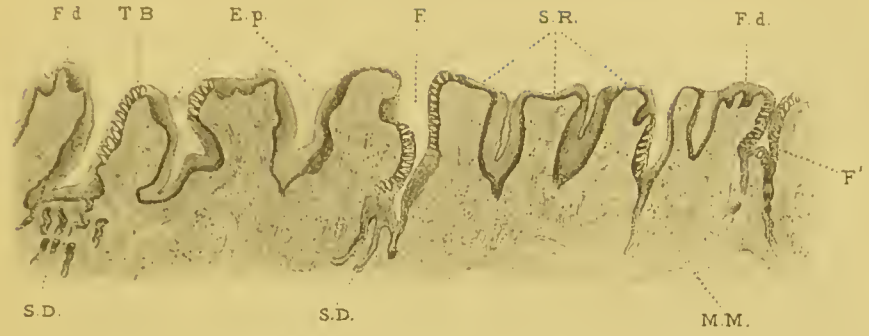
Non-medullated nerve fibres enter the bases of the folds, and their terminal branches ran towards the sides containing the taste-bulbs. Farther than this I was unable to trace them.

EXPLANATION OF PLATE XVIII.

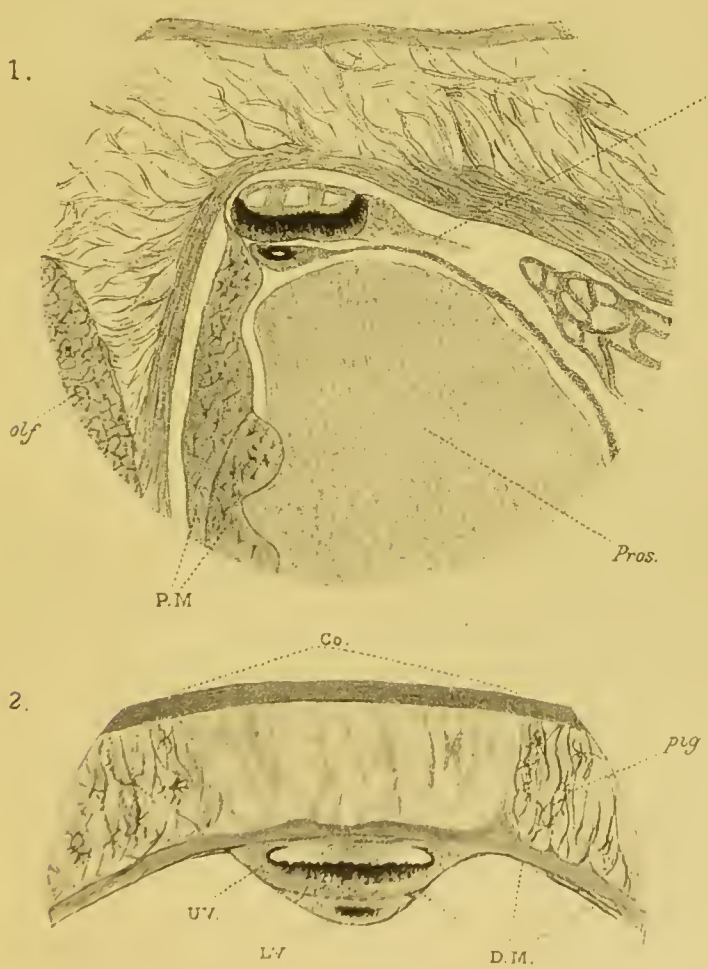
Upper Figure. Transverse vertical section through papilla foliata of an infant four months old. *Fd.*, folds; *S.R.*, secondary ridges; *Ep.*, epithelium; *F.*, furrow; *F'.*, invaginated furrow; *T.B.*, taste-bulbs; *S.D.*, serous ducts; *Mm.*, mucous membrane. × 18.

ERRATA in Author's Paper on *Fiber zibethicus*, January 1888.

Page 135, line 7, *for* colloidin, *read* celloidin.
„ 136, „ 15, *for* exists, *read* rests.
„ 138, „ 19, *for* gland, *read* band.



PAPILLA FOLIATA.



EPIPHYSIS CEREBRI.

F Huth. Lith^r Edin^r